EFFECT OF ADDITIVES ON COPPER ELECTROPLATING: VIBRATIONAL SPECTROSCOPIC AND AFM MEASUREMENTS

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The interplay of additives and trench features was examined to understand the origin of the superfilling phenomenon in Cu electrodeposition. Benzotriazole (BTA), bis-(sodium sulfoproply)-disulfide (SPS), polyethelyene glycol (PEG), and chloride were employed as the plating additives. Chemical transformations undergone by these additives both singly and in combination are addressed using vibrational spectroscopies. The filling of trenches lined initially with a CVD Cu seed layer was investigated using in situ atomic force microscopy (AFM). The AFM images were analyzed using several methods to determine the mechanism of growth of the electrodeposit. These results were correlated with those obtained analyzing the growth of Cu deposited onto a smooth Au(111) substrate.